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CLAIMS

1 1. A system for filtering input data comprising:
2 a filtering database for storing at least one rule table, said rule table comprising a data
3 element locator and a default rule; and
J a data filtering engine coupled to the filtering database for filtering said input data using
3/8/024 the at least one rule table in the filtering database.

1 1 2. The system for filtering input data in claim 1 wherein the filtering database comprises
2 layered tables of rule tables.

1 1 3. The system for filtering input data in claim 1 wherein the default rule comprises a
2 statistics counter.

1 1 4. The system for filtering input data in claim 1 wherein the at least one rule table further
2 comprises at least one filtering rule.

1 1 5. The system for filtering input data in claim 4 wherein the at least one filtering rule
2 comprises a statistics counter.

1 1 6. The system for filtering input data in claim 1 wherein the data element locator comprises
2 an offset and a mask for selecting a data element of the input data.

1 1 7. The system for filtering input data in claim 1 wherein the data element locator further
2 comprises a table timer.

1 1 8. The system for filtering input data in claim 1 wherein the data filtering engine further
2 comprises:

3 a data buffer for storing the input data;
4 a data element locator buffer for storing the data element locator; and
5 a rule evaluator for receiving the input data from the data buffer and applying the at least
6 one rule table to the input data.

1 9. A system for filtering input data comprising:
2 a filtering database comprising layered rule tables, each rule table comprising a data
3 element locator and a default rule; and
4 a data filtering engine coupled to the filtering database for filtering said input data using
5 the layered rule tables in the filtering database.

1 10. The system for filtering input data in claim 9 wherein each rule table further comprises at
2 least one filtering rule.

1 11. The system for filtering input data in claim 10 wherein the at least one filtering rule
2 comprises a statistics counter.

1 12. The system for filtering input data in claim 9 wherein the data element locator comprises
2 an offset and a mask for selecting a data element of the input data.

1 13. The system for filtering input data in claim 9 wherein the data filtering engine further
2 comprises:
3 a data buffer for storing the input data;
4 a data element locator buffer for storing the data element locator; and

5 a rule evaluator for receiving the input data from the data buffer and applying at least one
6 rule table to the input data.

1 14. The system for filtering input data in claim 13 wherein the rule evaluator uses the data
2 element locator to select a data element from the input data.

1 15. A system for filtering input data comprising:
2 a data buffer for storing the input data;
3 a data element locator for indicating a data element in the input data;
4 at least one rule table for storing the data element locator and at least one rule to be
5 applied to the data element in the input data; and

6 a rule evaluator having a first input coupled to the data buffer for using the data element
7 locator to determine the data element from the input data and for applying the at least one rule
8 table to the data element.

1 16. The system for filtering input data in claim 15 wherein the at least one rule table
2 comprises at least one filtering rule and at least one default rule to be applied to the data element
3 indicated by the data element locator.

1 17. The system for filtering input data in claim 16 wherein the at least one filtering rule and
2 the at least one default rule comprise a statistics counter.

1 18. The system for filtering input data in claim 15 further comprising:
2 a filtering database for storing the at least one rule table as layered tables of rules.

1 19. A system for filtering input data comprising:

2 a data buffer for storing the input data;
3 a data element locator for indicating a data element in the input data;
4 a filtering database comprising layered tables of rules, each rule table comprising the data
5 element locator and at least one rule to be applied to the data element in the input data; and
6 a rule evaluator having a first input coupled to the data buffer for using the data element
7 locator to determine the data element from the input data and for applying the at least one rule
8 table to the data element.

1 20. The system for filtering input data in claim 19 wherein each rule table comprises at least
2 one filtering rule and at least one default rule to be applied to the data element indicated by the
3 data element locator.

1 21. A method for filtering input data comprising at least one data element in a system
2 comprising a filtering database, wherein the filtering database comprises at least one rule table,
3 said at least one rule table comprising a data element locator and a default rule, the method
4 comprising the steps of:

5 selecting the data element from the input data;
6 comparing the selected data element to an upper bound of the filtering rule; and
7 comparing the selected data element to a lower bound of the filtering rule.

1 22. The method of claim 21 wherein the step of selecting the data element further comprises
2 the substeps of:
3 obtaining the data element locator from the rule table in the filtering database; and

4 applying the data element locator to the input data to select the data element from the
5 input data.

1 23. The method of claim 21 wherein the step of comparing the selected data element to an
2 upper bound of the filtering rule comprises the substep of:

3 determining whether the selected data element is less than or equal to the upper bound.

1 24. The method of claim 21 wherein the step of comparing the selected data element to a
2 lower bound of the filtering rule comprises the substep of:

3 determining whether the selected data element is greater than or equal to the lower bound.

DETAILED DESCRIPTION

1 25. A method for filtering input data in a system comprising a filtering database containing
2 layered tables of rule tables, the method comprising the steps of:

3 selecting a data element from the input data;

4 accessing a rule table in said layered tables of rule tables corresponding to the selected
5 data element; said rule table comprising at least one filtering rule; and

6 applying the at least one filtering rule to the selected data element.

1 26. The method of claim 25 wherein the step of selecting a data element further comprises
2 the substeps of:

3 obtaining a data element locator from the rule table in the filtering database; and

4 applying the data element locator to the input data to select the data element from the
5 input data.

1 27. The method of claim 25 wherein the step of applying the at least one filtering rule
2 comprises the substep of:
3 determining whether the selected data element is less than or equal to an upper bound.

1 28. The method of claim 25 wherein the step of applying the at least one filtering rule
2 comprises the substep of:
3 determining whether the selected data element is greater than or equal to a lower bound.

1 29. A system for filtering packets comprising:
2 a filtering database for storing at least one rule table, said at least one rule table
3 comprising a protocol element locator and a default rule; and
4 a packet filtering engine coupled to the filtering database for filtering said packets using
5 the at least one rule table in the filtering database.

1 30. The system for filtering packets in claim 29 wherein the filtering database comprises
2 layered tables of rule tables.

1 31. The system for filtering packets in claim 29 wherein the at least one rule table further
2 comprises at least one filtering rule.

1 32. The system for filtering packets in claim 31 wherein the at least one filtering rule
2 comprises a statistics counter.

1 33. The system for filtering packets in claim 29 wherein the protocol element locator
2 comprises an offset and a mask for selecting a protocol element of the packet.

1 34. The system for filtering packets in claim 29 wherein the protocol element locator further
2 comprises a table timer and statistics counters.

1 35. The system for filtering packets in claim 29 wherein the packet filtering engine further
2 comprises:

3 a packet buffer for storing packet;
4 a protocol element locator buffer for storing the protocol element locator; and
5 a rule evaluator for receiving the packet from the packet buffer and applying the at least
6 one rule table to the packet.

1 36. The system of claim 29 wherein the packet filtering engine is coupled to receive a packet
2 prototype modifying the filtering database.

1 37. A system for filtering packets comprising:
2 a filtering database comprising a plurality of layered rule tables, each rule table
3 comprising a protocol element locator and a default rule; and
4 a packet filtering engine coupled to the filtering database for filtering said packets using
5 the layered rule tables in the filtering database,
6 wherein the system is coupled to receive a packet prototype for determining a location to
7 be modified in the filtering database.

1 38. The system for filtering packets in claim 37 wherein each rule table further comprises at
2 least one filtering rule.

1 39. The system for filtering packets in claim 37 wherein the at least one filtering rule
2 comprises a statistics counter.

1 40. The system for filtering packets in claim 37 wherein the protocol element locator
2 comprises an offset and a mask for selecting a protocol element from the packet.

1 41. The system for filtering packets in claim 37 wherein the packet filtering engine further
2 comprises:

3 a packet buffer for storing packets;
4 a protocol element locator buffer for storing the protocol element locator; and
5 a rule evaluator for receiving the packet from the packet buffer and applying at least one
6 rule table to the packet.

1 42. The system for filtering packets in claim 37 wherein the rule evaluator uses the protocol
2 element locator to select a protocol element from the packet.

1 43. A system for filtering packets comprising:
2 a packet buffer for storing the packets;
3 a protocol element locator for indicating a protocol element in the packet;
4 at least one rule table for storing the protocol element locator and at least one filtering
5 rule to be applied to the protocol element in the packet; and
6 a rule evaluator having a first input coupled to the packet buffer for using the protocol
7 element locator to determine the protocol element from the packet and for applying the at least
8 one rule table to the protocol element.

1 44. The system for filtering packets in claim 43 wherein the at least one rule table comprises
2 at least one filtering rule and at least one default rule to be applied to the protocol element
3 indicated by the protocol element locator.

1 45. The system for filtering packets in claim 43 further comprising:
2 a filtering database for storing a decision tree as layered tables of rules.

1 46. The system for filtering packets in claim 43 further comprising a processor interface,
2 wherein the processor interface is coupled to receive a packet prototype for determining a
3 location in the filtering database.

1 47. A system for filtering packets comprising:
2 a packet buffer for storing packets;
3 a protocol element locator for indicating a protocol element in the packet;
4 a filtering database comprising layered tables of rules, each rule table comprising the
5 protocol element locator and at least one rule to be applied to the protocol element in the packet;
6 and
7 a rule evaluator having a first input coupled to the packet buffer for using the protocol
8 element locator to determine the protocol element from the packet and for applying the at least
9 one rule table to the protocol element.

1 48. The system for filtering packets in claim 47 wherein each rule table comprises at least
2 one filtering rule and at least one default rule to be applied to the protocol element indicated by
3 the protocol element locator.

1 49. The system for filtering packets in claim 47 further comprising a processor interface for
2 receiving a packet prototype, said packet prototype to be used in modifying the filtering database.

1 50. A method for filtering packets, each packet comprising at least one protocol element, in a
2 system comprising a filtering database, wherein the filtering database comprises at least one rule
3 table, said at least one rule table comprising a protocol element locator and a filtering rule, the
4 method comprising the steps of:

5 selecting the protocol element from the input data;
6 comparing the selected protocol element to an upper bound of the filtering rule; and
7 comparing the selected protocol element to a lower bound of the filtering rule.

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1 51. The method of claim 50 wherein the step of selecting the protocol element further
2 comprises the substeps of:
3 obtaining the protocol element locator from the rule table in the filtering database; and
4 applying the protocol element locator to the packet to select the protocol element from the
5 packet.

1 52. The method of claim 50 wherein the step of comparing the selected protocol element to
2 the upper bound of the filtering rule comprises the substep of:
3 determining whether the selected protocol element is less than or equal to the upper
4 bound.

1 53. The method of claim 50 wherein the step of comparing the selected protocol element to
2 the lower bound of the filtering rule comprises the substep of:

3 determining whether the selected protocol element is greater than or equal to the lower
4 bound.

1 54. The method of claim 50 further comprising the step of receiving a packet prototype for
2 modifying the filtering database.

1 55. A method for filtering packets in a system comprising a filtering database containing

2 layered tables of rule tables, the method comprising the steps of:

3 selecting a protocol element from the input data;

4 accessing a rule table in said layered tables of rule tables corresponding to the selected

5 protocol element; said rule table comprising at least one filtering rule; and

6 applying the at least one filtering rule to the selected protocol element.

1 56. The method of claim 55 wherein the step of selecting a protocol element further

2 comprises the substeps of:

3 obtaining a protocol element locator from the rule table in the filtering database; and

4 applying the protocol element locator to the packet to select the protocol element from the
5 packet.

1 57. The method of claim 55 wherein the step of applying the at least one filtering rule

2 comprises the substep of:

3 determining whether the selected protocol element is less than or equal to an upper

⁴ bound.

1 58. The method of claim 55 wherein the step of applying the at least one filtering rule
2 comprises the substep of:

3 determining whether the selected protocol element is greater than or equal to a lower
4 bound.

1 59. The method of claim 55 further comprising the step of receiving a packet prototype for
2 modifying the filtering database.

1 60. A system for filtering packets in parallel comprising:

2 a packet data interface, for receiving a packet; and
3 a parallel filtering database coupled to the packet data interface, the parallel filtering
4 database comprising a parallel filtering database entry.

1 61. The system in claim 60 wherein the filtering database further comprises:

2 at least one Table ID Content Addressable Memory (CAM);
3 a Filtering rule storage; and
4 an Associated Data.

1 62. The system in claim 60 wherein the system is coupled to receive a packet prototype for
2 modifying the parallel filtering database.

1 63. A system for modifying a filtering database comprising:
2 a packet prototype for determining a location to be modified in the filtering database, and
3 a filtering engine for receiving the packet prototype and for modifying the location
4 determined by the packet prototype.

1 64. The system of claim 63 wherein the packet prototype comprises:
2 at least one protocol element descriptor having an upper bound and a lower bound,
3 wherein said lower bound and said upper bound are used to point to a location in the filtering
4 database.

1 65. The system of claim 63 wherein the packet prototype is received from an external
2 software source.

1 66. A method for modifying a filtering database, the method comprising the steps of :
2 receiving a packet prototype, said packet prototype comprising an upper bound and a
3 lower bound;
4 using the packet prototype to determine a specific location in the filtering database; and
5 modifying the specific location in the filtering database.

1 67. The method of claim 66 wherein the packet prototype further comprises an offset and a
2 mask.

1 68. The method of claim 66 wherein the specific location in the filtering database is a
2 filtering rule.

1 69. The method of claim 66 wherein the specific location in the filtering database is a rule
2 table.

1 70. The method of claim 66 wherein the step of modifying the specific location in the
2 filtering database comprises adding or deleting a filtering rule.

1 71. The method of claim 66 wherein the step of modifying the specific location in the
2 filtering database comprises adding or deleting a rule table.